

LISTING OF THE CLAIMS

1. (Currently amended) A background electrolyte solution for detecting ions in a sample using capillary electrophoresis comprising:

a capillary electrophoresis probe that is comprised of at least one vinylogous carboxylic acid compound or derivative thereof in a concentration of about 2 to 5 mM, wherein ~~[[the]]~~ said vinylogous carboxylic acid compound is not tropolone.

2. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound has a structure comprising: one or more enol functional groups in linear conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds.

3. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is present as a keto-enol tautomer.

4. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is an aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

5. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is a hetero-atom analog of a keto-enol tautomer.

6. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is a heteroatom aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

7. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

8. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is 2,5-dihydroxy-1,4-benzoquinone.

9. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is 4,5-dihydroxy-4-cyclopentene-1,2,3-trione.

10. (Canceled).

11. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is 5,5-dimethyl-1,3-cyclohexanedione.

12. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is 6-hydroxy-1-tetralone.

13. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid ~~compounds~~ compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutene-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

14. (Currently amended) The background electrolyte solution of Claim 1 wherein said at least one vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter ~~its vinylogous carboxylic acid~~ said UV-chromophore.

15. (Previously presented) The background electrolyte solution of Claim 1 wherein said ions in said sample are anions and are selected from the group consisting of: bromide, carbonate, bicarbonate, chloride, fluoride, nitrate, nitrite, ~~phosphate and sulfate and~~

phosphate, sulfate, small molecular weight organic anions, anions, and any combination thereof.

16. (Canceled)

17. (Currently amended) The background electrolyte solution of Claim 1 wherein said ~~probe includes derivative is~~ a cationic enol ester derivative ~~of a vinylogous carboxylic acid compound.~~

18. (Currently amended) The background electrolyte solution of Claim 1 wherein said ~~probe includes derivative is~~ a cationic enol amide derivative ~~of a vinylogous carboxylic acid compound.~~

19. (Previously presented) The background electrolyte solution of Claim 1 wherein said ions in said sample are cations and are selected from the group consisting of: Na⁺, K⁺, Mg⁺², Ca⁺², ~~[[and]] small molecular weight organic eations:~~ cations, and any combination thereof.

20. (Currently amended) A background electrolyte solution for indirect detection of ions in a sample using capillary electrophoresis, comprising:

at least one capillary electrophoresis probe that is a vinylogous carboxylic acid ~~compound;~~ compound, or derivative thereof; and

a buffer.

21. (Currently amended) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound has a structure comprising: one or more enol functional groups in linear conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds.

22. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is present as a keto-enol tautomer.

23. (Currently amended) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is an aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

24. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is a hetero-atom analog of a keto-enol tautomer.

25. (Currently amended) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is a heteroatom aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

26. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

27. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is 2,5-dihydroxy-1,4-benzoquinone.

28. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is 4,5-dihydroxy-4-cyclopentene-1,2,3-trione.

29. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is 2-hydroxy-2,4,6-cycloheptatrienone.

30. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is 5,5-dimethyl-1,3-cyclohexanedione.

31. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is 6-hydroxy-1-tetralone.

32. (Previously presented) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexene-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4 ketobutyrolactam; 5,5-dimethyl-1,3-

cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

33. (Currently amended) The background electrolyte solution of Claim 20 wherein said vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter its vinylogous carboxylic acid said UV-chromophore.

34. (Canceled)

35. (Previously presented) The background electrolyte solution of claims 1 or 20 wherein said background electrolyte solution is provided in a kit for use in a capillary electrophoresis system.

36. (Canceled)

37. (Canceled)

38. (Previously presented) The background electrolyte solution of Claim 20 wherein the vinylogous carboxylic acid compound is present at a concentration in the range of about 2 to 5 mM.

39. (Currently amended) A method of indirectly detecting ions in a sample using capillary electrophoresis, comprising:

introducing a sample into a capillary with a background electrolyte solution containing comprising one or more capillary electrophoresis probes probes, wherein at least one of said probes is a vinylogous carboxylic acid compound, or derivative thereof, and a buffer;

applying an electric field along [[the]] said capillary to cause the ions in the sample to move along [[the]] said capillary to a detection region and to separate from each other along [[the]] said capillary; and

detecting the ions indirectly by ultraviolet photometric detection.

40. (Currently amended) The method of Claim 39 wherein said vinylogous carboxylic acid compound has a structure comprising: one or more enol functional groups in

linear conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds.

41. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is present as a keto-enol tautomer.

42. (Currently amended) The method of Claim 39 wherein said vinylogous carboxylic acid compound is an aromatic compound having a stabilized resonance structure that is part of its vinylogous carboxylic acid function provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

43. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is a hetero-atom analog of a keto-enol tautomer.

44. (Currently amended) The method of Claim 39 wherein said vinylogous carboxylic acid compound is a heteroatom aromatic compound having a stabilized resonance structure that is part of its vinylogous carboxylic acid function provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

45. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

46. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is 2,5-dihydroxy-1,4-benzoquinone.

47. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is 4,5-dihydroxy-4-cyclopentene-1,2,3-trione.

48. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is 2-hydroxy-2,4,6-cycloheptatrienone.

49. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is 5,5-dimethyl-1,3-cyclohexanedione.

50. (Previously presented) The method of Claim 39 wherein said vinylogous carboxylic acid compound is 6-hydroxy-1-tetralone.

51. (Currently amended) The ~~probe~~ method of Claim 39 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

52. (Currently amended) The method of Claim 39 wherein said ~~vinylogous carboxylic acid compound~~ derivative is a cationic enol ester ~~derivative of a vinylogous carboxylic acid~~.

53. (Currently amended) The method of Claim 39 wherein said ~~vinylogous carboxylic acid compound~~ derivative is a cationic enol amide ~~derivative of a vinylogous carboxylic acid~~.

54. (Previously presented) The method of Claim 39 wherein said capillary has an interior that is treated to reverse cathodal electro osmotic flow.

55. (Previously presented) The method of Claim 39 wherein said one or more probes are selected such that ions of differing molecular weight in said sample may be detected by each of said probes.

56. (Previously presented) The method of Claim 39 wherein said ions are anions.

57. (Previously presented) The method of Claim 39 wherein said ions are cations, and are selected from the group consisting of: Na^+ , K^+ , Mg^{+2} , Ca^{+2} , ~~[[and]]~~ small molecular weight organic ~~cations~~; cations, and any combination thereof.

58. (Previously presented) The method of Claim 56 wherein said capillary is an anodal capillary and anodal flow of said anions occurs within said capillary.

59. (Previously presented) The method of Claim 56 wherein said background electrolyte solution includes an electro-osmotic flow modifier and anodal flow of said anions occurs within said capillary, and wherein said one or more probes is of sufficiently high molar absorptivity that its concentration is low enough to avoid precipitating the modifier within the capillary.

60. (Currently amended) A capillary electrophoresis apparatus for indirectly detecting ions in a sample, comprising:

a capillary having a background electrolyte solution ~~containing~~ comprising one or more capillary electrophoresis probes that is a vinylogous carboxylic acid compound, or derivative thereof, and a buffer;

an electrical source that is configured to apply an electric field along ~~[[the]]~~ said capillary to cause the ions to move and to separate from each other along ~~[[the]]~~ said capillary to a detection ~~region~~, region; and

a detector that is configured to detect the ions by indirect ultraviolet photometric detection.

61. (Currently amended) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound has a structure comprising: one or more enol functional groups in linear conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds.

62. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is present as a keto-enol tautomer.

63. (Currently amended) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is an aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

64. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is a hetero-atom analog of a keto-enol tautomer.

65. (Currently amended) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is a heteroatom aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

66. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

67. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is 2,5-dihydroxy-1,4-benzoquinone.

68. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is 4,5-dihydroxy-4-cyclopentene-1,2,3-trione.

69. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is 2-hydroxy-2,4,6-cycloheptatrienone.

70. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is 5,5-dimethyl-1,3-cyclohexanedione.

71. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is 6-hydroxy-1-tetralone.

72. (Previously presented) The apparatus of Claim 60 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

73. (Currently amended) The apparatus of Claim 60 wherein said ~~vinylogous carboxylic acid compound~~ derivative is a cationic enol ester ~~derivative of a vinylogous carboxylic acid~~.

74. (Currently amended) The apparatus of Claim 60 wherein said ~~vinylogous carboxylic acid compound~~ derivative is a cationic enol amide ~~derivative of a vinylogous carboxylic acid~~.

75. (Currently amended) A kit for indirectly detecting ions in a sample by capillary electrophoresis, comprising:

a background electrolyte solution comprising one or more capillary electrophoresis probes that is a vinylogous carboxylic acid ~~compound~~ compound, or derivative thereof, and a buffer.

76. (Canceled)

77. (Currently amended) The kit of Claim 75 wherein said vinylogous carboxylic acid compound has a structure comprising: one or more enol functional groups in linear conjugation with one or more carbonyl functional groups through one or more carbon-carbon or carbon-nitrogen double bonds.

78. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is present as a keto-enol tautomer.

79. (Currently amended) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is an aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

80. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is a hetero-atom analog of a keto-enol tautomer.

81. (Currently amended) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is a heteroatom aromatic compound having a stabilized resonance structure that ~~is part of its vinylogous carboxylic acid function~~ provides conjugation between one or more hydroxyl groups and one or more carbonyl groups.

82. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

83. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is 2,5-dihydroxy-1,4-benzoquinone.

84. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is 4,5-dihydroxy-4-cyclopentene-1,2,3-trione.

85. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is 2-hydroxy-2,4,6-cycloheptatrienone.

86. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is 5,5-dimethyl-1,3-cyclohexanedione.

87. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is 6-hydroxy-1-tetralone.

88. (Previously presented) The kit of Claim 75 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

89. (Currently amended) The kit of Claim 75 wherein said ~~vinylogous carboxylic acid compound~~ derivative is a cationic enol ester ~~derivative of a vinylogous carboxylic acid~~.

90. (Currently amended) The kit of Claim 75 wherein said ~~vinylogous carboxylic acid compound~~ derivative is a cationic enol amide ~~derivative of a vinylogous carboxylic acid~~.

91. (Previously presented) The background electrolyte solution of Claims 1 or 20, having a pH in the range of about 7 to 10.

92. (Previously presented) The background electrolyte solution of Claims 1 or 20, having a pH in the range of 2–3.

93. (Previously presented) The background electrolyte solution of claim 20 wherein the buffer is selected from the group consisting of: a tris base, an amine, and an organic base.

94. (Previously presented) The background electrolyte solution of Claims 1 or 20 additionally comprising a dynamic electroosmotic flow modifier.

95. (Previously presented) The background electrolyte solution of Claim 94 wherein the dynamic electroosmotic flow modifier is cetyltrimethylammonium bromide or didodecyldimethylammonium bromide.

96. (Previously presented) The background electrolyte solution of Claims 1 or 20 additionally comprising an organic solvent.

97. (Previously presented) The background electrolyte solution of claim 96 wherein the organic solvent is selected from the group consisting of: methanol, ethanol, and acetone.

98. (Previously presented) The method of claim 39 wherein the background electrolyte solution has a pH in the range of about 7 to 10.

99. (Previously presented) The method of claim 39 wherein the background electrolyte solution has a pH in the range of 2–3.

100. (Previously presented) The method of claim 39 wherein the buffer is selected from the group consisting of: a tris base, an amine, and an organic base.

101. (Previously presented) The method of claim 59 wherein the electro-osmotic flow modifier is cetyltrimethylammonium bromide or didodecyldimethylammonium bromide.

102. (Previously presented) The method of claim 39 wherein the vinylogous carboxylic acid compound has a concentration of about 2 to 5 mM.

103. (Previously presented) The method of claim 39 wherein the background electrolyte solution additionally comprises an organic solvent.

104. (Currently amended) The method of claim [[96]] 103 wherein the organic solvent is selected from the group consisting of: methanol, ethanol, and acetone.

105. (Previously presented) The apparatus of claim 60 wherein the vinylogous carboxylic acid compound has a concentration of about 2 to 5 mM.

106. (Previously presented) The apparatus of claim 60 wherein the background electrolyte solution has a pH in the range of about 7 to 10.

107. (Previously presented) The apparatus of claim 60 wherein the background electrolyte solution has a pH in the range of 2–3.

108. (Previously presented) The apparatus of claim 60 wherein the buffer is selected from the group consisting of: a tris base, an amine, and an organic base.

109. (Previously presented) The apparatus of claim 60 additionally comprising a dynamic electroosmotic flow modifier.

110. (Previously presented) The apparatus of claim 109 wherein the electroosmotic flow modifier is cetyltrimethylammonium bromide or didodecyldimethylammonium bromide.

111. (Previously presented) The apparatus of claim 60 wherein the background electrolyte solution additionally comprises an organic solvent.

112. (Previously presented) The apparatus of claim 111 wherein the organic solvent is selected from the group consisting of: methanol, ethanol, and acetone.

113. (Previously presented) The kit of claim 75 wherein the vinylogous carboxylic acid compound has a concentration of about 2 to 5 mM.

114. (Previously presented) The kit of claim 75 wherein the background electrolyte solution has a pH in the range of about 7 to 10.

115. (Previously presented) The kit of claim 75 wherein the background electrolyte solution has a pH in the range of 2–3.

116. (Previously presented) The kit of claim 75 wherein the buffer is selected from the group consisting of: a tris base, an amine, and an organic base.

117. (Previously presented) The kit of claim 75 additionally comprising a dynamic electroosmotic flow modifier.

118. (Previously presented) The kit of claim 117 wherein the electroosmotic flow modifier is cetyltrimethylammonium bromide or didodecyldimethylammonium bromide.

119. (Previously presented) The kit of claim 75 wherein the background electrolyte additionally comprises an organic solvent.

120. (Previously presented) The kit of claim 119 wherein the organic solvent is selected from the group consisting of: methanol, ethanol, and acetone.

121. (Currently amended) A method of indirectly detecting ions in a sample using capillary electrophoresis, comprising:

introducing the sample into a capillary with a background electrolyte solution containing one or more capillary electrophoresis probes that is a vinylogous carboxylic acid compound, or derivative thereof, wherein ~~[[the]]~~ said vinylogous carboxylic acid compound is not tropolone;

applying an electric field along ~~[[the]]~~ said capillary to cause the ions in the sample to move and to separate along ~~[[the]]~~ said capillary to a detection ~~region~~, region; and detecting the ions indirectly by ultraviolet photometric detection.

122. (Previously presented) The method of claim 121, wherein said vinylogous carboxylic acid compound has a concentration of about 2 to 5 mM.

123. (Currently amended) A capillary electrophoresis apparatus for indirectly detecting ions in a sample, comprising:

a capillary having a background electrolyte solution containing one or more capillary electrophoresis probes that is a vinylogous carboxylic acid compound, or derivative thereof, wherein ~~[[the]]~~ said vinylogous carboxylic acid compound is not tropolone; an electrical source which applies an electric field along ~~[[the]]~~ said capillary to cause the ions to move and to separate along ~~[[the]]~~ said capillary to a detection ~~region~~, region; and a detector which detects the ions by indirect ultraviolet photometric detection.

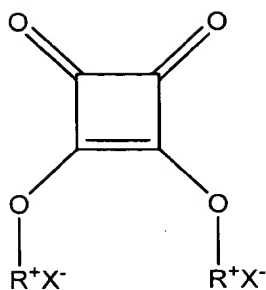
124. (Previously presented) The apparatus of claim 123, wherein said vinylogous carboxylic acid compound has a concentration of about 2 to 5 mM.

125. (Currently amended) A kit for indirectly detecting ions in a sample by capillary electrophoresis, comprising:

a background electrolyte solution containing one or more capillary electrophoresis probes that is a vinylogous carboxylic acid compound, or derivative thereof, wherein ~~[[the]]~~ said vinylogous carboxylic acid compound is not tropolone.

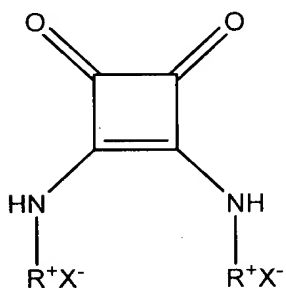
126. (Previously presented) The kit of claim 125, wherein said vinylogous carboxylic acid compound has a concentration of about 2 to 5 mM.

127. (Currently amended) The background electrolyte solution of claim 17 wherein the ester ~~derivative~~ has the structure:



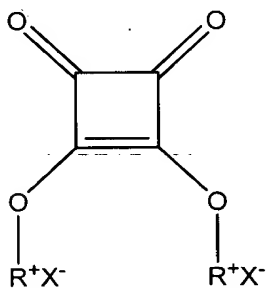
wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

128. (Currently amended) The background electrolyte solution of claim 18 wherein the amide ~~derivative~~ has the structure:



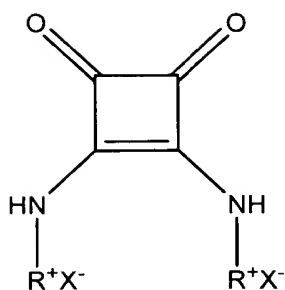
wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

129. (Currently amended) The method of claim 52 wherein the ester ~~derivative~~ has the structure:



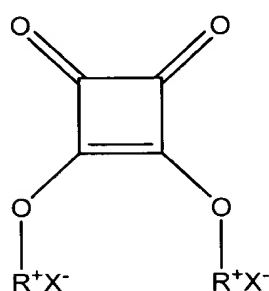
wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

130. (Currently amended) The method of claim 53 wherein the amide ~~derivative~~ has the structure:



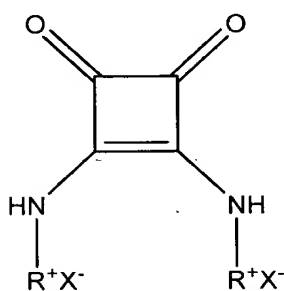
wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

131. (Currently amended) The apparatus of claim 73 wherein the ester derivative has the structure:



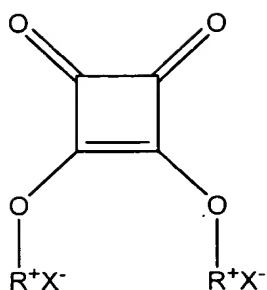
wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

132. (Currently amended) The apparatus of claim 74 wherein the amide derivative has the structure:



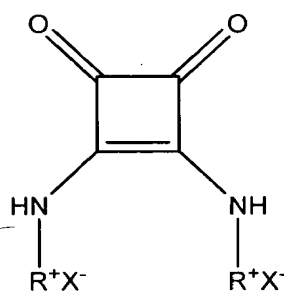
wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

133. (Currently amended) The kit of claim 89 wherein the ester derivative has the structure:



wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

134. (Currently amended) The kit of claim 90 wherein the amide derivative has the structure:



wherein X^- is an ionizable counter ion, and R^+ is an organic cation group.

135. (New) A background electrolyte solution for detecting small molecular weight ions in a sample using capillary electrophoresis comprising:

a probe that is comprised of at least one vinylogous carboxylic acid compound or derivative thereof in a concentration of about 2 to 5 mM, wherein said vinylogous carboxylic acid compound is not tropolone and wherein said probe has an electrophoretic mobility comparable to the ions.

136. (New) The background electrolyte solution of Claim 135 wherein said at least one vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

137. (New) The background electrolyte solution of Claim 135 wherein said at least one vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutene-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-

ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

138. (New) The background electrolyte solution of Claim 135 wherein said at least one vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter said UV-chromophore.

139. (New) The background electrolyte solution of Claim 135 wherein said ions in said sample are anions and are selected from the group consisting of: bromide, carbonate, bicarbonate, chloride, fluoride, nitrate, nitrite, phosphate and sulfate and small molecular weight organic anions.

140. (New) The background electrolyte solution of Claim 135 wherein said ions in said sample are cations and are selected from the group consisting of: Na^+ , K^+ , Mg^{+2} , Ca^{+2} , and small molecular weight organic cations, and any combination thereof.

141. (New) The background electrolyte solution of Claim 135 wherein said derivative is a cationic enol ester derivative.

142. (New) The background electrolyte solution of Claim 135 wherein said derivative is a cationic enol amide derivative.

143. (New) A background electrolyte solution for indirect detection of small molecular weight ions in a sample using capillary electrophoresis, comprising:

at least one probe that is a vinylogous carboxylic acid compound, or derivative thereof, wherein said probe has an electrophoretic mobility comparable to the ions; and

a buffer.

144. (New) The background electrolyte solution of Claim 143 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

145. (New) The background electrolyte solution of Claim 143 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-

cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

146. (New) The background electrolyte solution of Claim 143 wherein said vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter said UV-chromophore.

147. (New) The background electrolyte solution of Claim 143 wherein said ions in said sample are anions and are selected from the group consisting of: bromide, carbonate, bicarbonate, chloride, fluoride, nitrate, nitrite, phosphate, sulfate, and small molecular weight organic anions, and any combination thereof.

148. (New) The background electrolyte solution of Claim 143 wherein said ions in said sample are cations and are selected from the group consisting of: Na^+ , K^+ , Mg^{+2} , Ca^{+2} , and small molecular weight organic cations, and any combination thereof.

149. (New) The background electrolyte solution of Claim 143 wherein said derivative is a cationic enol ester derivative.

150. (New) The background electrolyte solution of Claim 143 wherein said derivative is a cationic enol amide derivative.

151. (New) A method of indirectly detecting small molecular weight ions in a sample using capillary electrophoresis, comprising:

- introducing a sample into a capillary with a background electrolyte solution containing one or more probes wherein at least one of said probes is a vinylogous carboxylic acid compound, or derivative thereof, wherein said probe has an electrophoretic mobility comparable to the ions, and a buffer;
- applying an electric field along said capillary to cause the ions in the sample to move along said capillary to a detection region and to separate from each other along said capillary; and
- detecting the ions indirectly by ultraviolet photometric detection.

152. (New) The method of Claim 151 wherein said at least one vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

153. (New) The method of Claim 151 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

154. (New) The method of Claim 151 wherein said vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter said UV-chromophore.

155. (New) The method of Claim 151 wherein said ions in said sample are anions and are selected from the group consisting of: bromide, carbonate, bicarbonate, chloride, fluoride, nitrate, nitrite, phosphate, sulfate, and small molecular weight organic anions, and any combination thereof.

156. (New) The method of Claim 151 wherein said ions in said sample are cations and are selected from the group consisting of: Na^+ , K^+ , Mg^{+2} , Ca^{+2} , and small molecular weight organic cations, and any combination thereof.

157. (New) The method of Claim 151 wherein said derivative is a cationic enol ester derivative.

158. (New) The method of Claim 151 wherein said derivative is a cationic enol amide derivative.

159. (New) A capillary electrophoresis apparatus for indirectly detecting small molecular weight ions in a sample, comprising:

a capillary having a background electrolyte solution containing one or more probes that is a vinylogous carboxylic acid compound, or derivative thereof, wherein said probe has an electrophoretic mobility comparable to the ions, and a buffer;

an electrical source that is configured to apply an electric field along said capillary to cause the ions to move and to separate from each other along said capillary to a detection region; and

a detector that is configured to detect the ions by indirect ultraviolet photometric detection.

160. (New) The apparatus of Claim 159 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

161. (New) The apparatus of Claim 159 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

162. (New) The apparatus of Claim 159 wherein said vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter said UV-chromophore.

163. (New) The apparatus of Claim 159 wherein said ions in said sample are anions and are selected from the group consisting of: bromide, carbonate, bicarbonate, chloride, fluoride, nitrate, nitrite, phosphate and sulfate and small molecular weight organic anions.

164. (New) The apparatus of Claim 159 wherein said ions in said sample are cations and are selected from the group consisting of: Na^+ , K^+ , Mg^{+2} , Ca^{+2} , and small molecular weight organic cations.

165. (New) The apparatus of Claim 159 wherein said derivative is a cationic enol ester derivative.

166. (New) The apparatus of Claim 159 wherein said derivative is a cationic enol amide derivative.

167. (New) A kit for indirectly detecting small molecular weight ions in a sample by capillary electrophoresis, comprising:

a background electrolyte solution comprising one or more probes that is a vinylogous carboxylic acid compound, or derivative thereof, wherein said probe has an electrophoretic mobility comparable to the ions, and a buffer.

168. (New) The kit of Claim 167 wherein said vinylogous carboxylic acid compound is 3,4-dihydroxy-3-cyclobutene-1,2-dione.

169. (New) The kit of Claim 167 wherein said vinylogous carboxylic acid compound is selected from the group consisting of: 3,4-dihydroxy-3-cyclobutane-1,2-dione; 2,5-dihydroxy-1,4-benzoquinone; 4,5-dihydroxy-4-cyclopentene-1,2,3-trione; 2-hydroxy-2,4,6-cycloheptatrienone; 5,6-dihydroxy-5-cyclohexane-1,2,3,4-tetraone; 2-hydroxy-1,4-naphthoquinone; 3-oxo-1-gulofuranolactone; 2,2-dimethyl-1,3-dioxane-4,6-dione; 4-ketobutyrolactam; 5,5-dimethyl-1,3-cyclohexanedione; tetrahydrofuran-2,4-dione; 6-hydroxy-1-tetralone; 2,3-dihydroxy-2-cyclopropene-1-one; and uric acid.

170. (New) The kit of Claim 167 wherein said vinylogous carboxylic acid compound has a vinylogous carboxylic acid UV-chromophore and has a peripheral substituent that does not alter said UV-chromophore.

171. (New) The kit of Claim 167 wherein said ions in said sample are anions and are selected from the group consisting of: bromide, carbonate, bicarbonate, chloride, fluoride, nitrate, nitrite, phosphate, sulfate, and small molecular weight organic anions, and any combination thereof.

172. (New) The kit of Claim 167 wherein said ions in said sample are cations and are selected from the group consisting of: Na^+ , K^+ , Mg^{+2} , Ca^{+2} , and small molecular weight organic cations, and any combination thereof.

173. (New) The kit of Claim 167 wherein said derivative is a cationic enol ester derivative.

174. (New) The kit of Claim 167 wherein said derivative is a cationic enol amide derivative.

175. (New) A background electrolyte solution of any one of claims 1, 20, 135, and 136 wherein the ions are present at about 500 ppt in the sample.

176. (New) A background electrolyte solution of any one of claims 1, 20, 135, and 136 wherein the ions are present between 80 and 320 ppb in the sample.

177. (New) A background electrolyte solution of any one of claims 1, 20, 135, and 136 wherein said vinylogous carboxylic acid compound exhibits absorption in the UV spectrum at wavelengths of about 270 nm and higher.

178. (New) A background electrolyte solution of claim 142 wherein the vinylogous carboxylic acid compound exhibits absorption in the UV spectrum at wavelengths of between 270 and 320 nm.